

REMARKS

The Examiner's careful review and examination of the subject application are noted and appreciated.

The present invention relates to A hydrogen storage alloy comprising a first phase comprising 10 to 40 atomic percent titanium, 27 to 80 atomic percent vanadium, 10 to 60 atomic percent chromium and greater than 0 to 15 atomic percent manganese and a secondary phase comprising one or more oxides, nitrides, carbides, oxycarbides, oxynitrides, carbonitrides, or oxycarbonitrides, wherein the one or more oxides, nitrides, carbides, oxycarbides, oxynitrides, carbonitrides, or oxycarbonitrides each include at least one metal selected from misch metal, magnesium, or calcium dispersed throughout said first phase. The hydrogen storage alloy, at temperatures of 40°C or less, reversibly stores at least 1.75 weight percent hydrogen and desorbs at least 60% of the maximum hydrogen storage capacity.

Applicants have carefully reviewed the above-identified Office Action. Applicants contend that, in view of the clarifying remarks set forth herein, all bases of objection and rejection have been overcome. Accordingly, Applicants respectfully request withdrawal of the pending rejections and allowance of the claims submitted.

CLAIM OBJECTION

The objection to Claim 14 has been obviated by appropriate amendment. Accordingly, Applicants respectfully request that the objection to Claim 14 be withdrawn.

SUPPORT FOR CLAIM AMENDMENTS

Support for amendment to the claims can be found in, for example, page 18 of the specification as originally filed. As such, no new matter has been added.

CLAIM REJECTIONS UNDER 35 U.S.C. §112

The rejection to claims 1, 15 to 18 and 20 under 35 U.S.C. §112 has been obviated by appropriate amendment and should be withdrawn. All adapted to language has been removed from the aforementioned claims.

OBVIOUSNESS-TYPE DOUBLE PATENTING

The rejection of claims 1-24 based on the judicially created doctrine of obviousness-type double patenting over Sapru et al. (U.S. Pat. No. 6,616,891) has been obviated by appropriate amendment and should be withdrawn.

Sapru et al. discloses high capacity transition metal based hydrogen storage materials for the reversible storage of hydrogen (Title). The hydrogen storage alloy comprises titanium, vanadium

chromium, and optionally manganese and molybdenum. The hydrogen storage alloy may reversibly store up to 2.8 wt% hydrogen at temperatures up to 150 °C.

In contrast, the presently pending invention claims a hydrogen storage alloy having a first phase and a secondary phase dispersed throughout the first phase. The secondary phase comprises one or more oxides, nitrides, carbides, oxycarbides, oxynitrides, carbonitrides, or oxycarbonitrides, wherein said one or more oxides, nitrides, carbides, oxycarbides, oxynitrides, carbonitrides, or oxycarbonitrides each include at least one metal selected from misch metal, magnesium, or calcium. The excellent reversible capacity and desorption rates of the alloys of the present invention are attributed to the secondary phase distributed in the first phase. Sapru et al. do not teach the reversible capacity and desorption rates of the alloys of the present invention. Therefore, Sapru et al. do not disclose a hydrogen storage alloy as presently claimed. As such, the presently pending invention is readily distinguishable and clearly patentable over the cited reference and the rejection should be withdrawn.

CLAIM REJECTIONS UNDER 35 U.S.C. §102/§103

For the reasons which follow hereinafter, the rejection of claims 1, 2, 8, 9, and 14-19 under 35 U.S.C. §102/§103 as being anticipated by/obvious over Okada et al. ('723) and Okada ('490)

[REDACTED] has been obviated by appropriate amendment and should be withdrawn.

Okada et al. ('723) discloses a method for preparing a hydrogen storage alloy (Title). The hydrogen storage alloy is multiphase having a main phase BCC structure.

Okada ('490) discloses an alloy for hydrogen storage, method for absorption and release of hydrogen using the alloy and a hydrogen fuel cell using the method. The hydrogen storage alloy has a multiphase structure (See col. 4, lines 3-10).

In contrast, the presently pending invention claims a hydrogen storage alloy having a first phase and a secondary phase dispersed throughout the first phase. The secondary phase comprises one or more oxides, nitrides, carbides, oxycarbides, oxynitrides, carbonitrides, or oxycarbonitrides, wherein said one or more oxides, nitrides, carbides, oxycarbides, oxynitrides, carbonitrides, or oxycarbonitrides each include at least one metal selected from misch metal, magnesium, or calcium. The excellent reversible capacity and desorption rates of the alloys of the present invention are attributed to the secondary phase distributed in the first phase. Okada et al. and Okada do not teach the reversible capacity and desorption rates of the alloys of the present invention. Therefore, neither Okada et al. nor Okada, disclose a hydrogen storage alloy as presently claimed. As such, the presently pending invention is readily distinguishable and clearly patentable over the cited reference and the rejection

should be withdrawn.

For the reasons which follow hereinafter, the rejection of claims 1, 2, 5, 8, 9, and 14-19 under 35 U.S.C. §102/§103 as being anticipated by/obvious over Okada et al. ('444) and should be withdrawn.

Okada et al. discloses a method of absorption-desorption of hydrogen storage alloy and hydrogen storage alloy and fuel cell using said method (Title). The hydrogen storage alloy is a body centered cubic hydrogen storage alloy having a spinodal decomposition phase.

In contrast, the presently pending invention claims a hydrogen storage alloy having a first phase and a secondary phase dispersed throughout the first phase. The secondary phase comprises one or more oxides, nitrides, carbides, oxycarbides, oxynitrides, carbonitrides, or oxycarbonitrides, wherein said one or more oxides, nitrides, carbides, oxycarbides, oxynitrides, carbonitrides, or oxycarbonitrides each include at least one metal selected from misch metal, magnesium, or calcium. The excellent reversible capacity and desorption rates of the alloys of the present invention are attributed to the secondary phase distributed in the first phase. Okada et al. do not teach the reversible capacity and desorption rates of the alloys of the present invention. Therefore, Okada et al., do not disclose a hydrogen storage alloy as presently claimed. As such, the presently pending

invention is readily distinguishable and clearly patentable over the cited reference and the rejection should be withdrawn.

For the reasons which follow hereinafter, the rejection of claims 1, 2, 8-11, and 13-24 under 35 U.S.C. §102/§103 as being anticipated by/obvious over Kurimoto has been obviated by appropriate amendment and should be withdrawn.

Kurimoto discloses hydrogen storage alloys having a BCC structure. The hydrogen storage alloys are Ti-Cr-V based with one or more modifiers selected from Mn, Co, Ni, Zr, N, Hf, Ta, and Al added thereto.

In contrast, the presently pending invention claims a hydrogen storage alloy having a first phase and a secondary phase dispersed throughout the first phase. The secondary phase comprises one or more oxides, nitrides, carbides, oxycarbides, oxynitrides, carbonitrides, or oxycarbonitrides, wherein said one or more oxides, nitrides, carbides, oxycarbides, oxynitrides, carbonitrides, or oxycarbonitrides each include at least one metal selected from misch metal, magnesium, or calcium. The excellent reversible capacity and desorption rates of the alloys of the present invention are attributed to the secondary phase distributed in the first phase. Kurimoto does not teach the reversible capacity and desorption rates of the alloys of the present invention. Therefore, Kurimoto does not disclose a hydrogen storage alloy as presently claimed. As such, the presently pending

invention is readily distinguishable and clearly patentable over the cited reference and the rejection should be withdrawn.

CLAIM REJECTIONS UNDER 35 U.S.C. §103

For the reasons which follow hereinafter, the rejection of claims 3, 4, 6, 7, 10, 11, 12, 13 and 20-24 under 35 U.S.C. §103 as being unpatentable over Okada ('444) has been obviated by appropriate amendment and should be withdrawn. Claims 3, 4, 6, 7, 10, 11, 12, 13 depend, directly or indirectly, from independent claim 1, which is now believed to be allowable and Claims 20-24 have been canceled from the pending application.

For the reasons which follow hereinafter, the rejection of claims 1-24 under 35 U.S.C. §103 as being unpatentable over Sapru et al. is respectfully traversed and should be withdrawn.

35 U.S.C §103(c) states that "[s]ubject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person" and "... subject matter developed by another person and a claimed invention shall be deemed to have been owned by the same person or subject to an obligation of assignment to the same person if the claimed

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invention was made by or on behalf of parties to a joint research agreement that was in effect on or before the date the claimed invention was made". At the time the present invention was made, the present invention was under obligation of assignment to Texaco Ovonic Hydrogen Systems, LLC, a 50/50 joint venture between Energy Conversion Devices, Inc. and Chevron Texaco Corporation and the subject matter of U.S. Pat. No. 6,616,891 was already assigned to Energy Conversion Devices, Inc. As such, U.S. Pat. No. 6,616,891 shall not preclude patentability of the present invention under 35 U.S.C. 103 and therefore Applicants respectfully request that the pending rejection be withdrawn.

Accordingly, Applicant submits that the present amendment places the application in condition for allowance. The Examiner is respectfully requested to pass the application to issuance.

